

## Influence of Sleep on Quality of Life Among Hospital Nurses

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### Abstract

**Introduction:** Sleep disorders are the cause of morbidity and mortality and can decrease functional capacity and quality of life. Nurses, especially those working irregular or night shifts, are at risk for developing sleep disorders. The present study aims to determine the relationship between sleep quality and health-related quality of life (HRQOL) as well as quantitative and subjective aspects of sleep quality in nurses.

**Methods:** This cross-sectional study was conducted on 1456 nurses working in 11 hospitals in Shiraz and Tehran (Iran) in 2014. Structured questionnaires (Pittsburg Sleep Quality Index [PSQI] and Medical Outcomes Study Short Form-36 Survey [SF-36]) were used to collect data on participants' demographic characteristics, sleep quality, and health-related quality of life. Chi-square and independent samples t-test were employed for statistical analysis.

**Results:** Mean age of participants was  $30.81 \pm 7.8$ , and most of them were female (89.04%) and poor sleepers. Long-duration sleepers slept for more than 9.8 h/night, and they obtained higher scores than short-duration sleepers (<4.5 h/night) in all SF-36 domains. The study results showed that increased quality of life was significantly related to health-related quality of life.

**Conclusions:** This study showed strong evidence that sleep disorders, such as poor quality and short duration of sleep, are negatively associated with HRQOL. Therefore, developing systemic strategies to cope with the problem seems to be necessary.

**Keywords:** quality of life, sleep disorders, sleep initiation, personal satisfaction

### 1. Introduction

Sleep disorder is a common and complicated health problem. Sleep certainly contributes positively to health and welfare, and sleep disorders are related to death, mortality, and decrease in functional capacity and quality of life (QOL). In Asia, the incidence of sleep disturbance among the general population ranged from 26.4% to 39.4% (1). On the other hand, several studies have reported that impaired sleep is a common problem among nurses (2). Humans spend about one-third of their lives asleep. Insomnia is the most common sleep-related complaint, and the second common general complaint after pain (3). A meta-analysis provided evidence of insomnia prevalence of 18.5% in university students, which is considerably higher than 7.4% in the general population (4). The prevalence of at least one type of reported sleep disturbance in nurses working in Chinese psychiatric and general hospitals in 2015 was 69.7%; the rates of difficulty initiating sleep, difficulty maintaining sleep, and early morning awakening were 54.6%, 54.7%, and 55.9%, respectively (5). A similar study by Leger et al. conducted on 12,778 subjects in France in 2000 revealed that the prevalence of insomnia was 29% (6).

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In a study by Sutton et al. in Canadian, the English-speaking population aged 15 years and above pointed out that 25% of the population suffered from insomnia (7). Moreover, a previous study in 1997 evaluated sleep complaints in a sample of German citizens above 13 years of age (8). The study results demonstrated that 25% of the population sometimes experienced insomnia, and 7% suffered frequently or always from difficulties in falling asleep and/or staying asleep, which was not related to external factors. One other study in Japan indicated that 20.3% of the 6277 new outpatients from 11 hospitals had experienced insomnia for more than one month (9). Yet, only 37% of them were treated with hypnotic medications. Similar results were also obtained in another study conducted in a representative sample in Japan (n=3030) (10). A Norwegian survey evaluated a representative sample of adults (n=2001) participating in telephone interviews regarding the 1-month prevalence of insomnia and hypnotics prescription (11). The results showed that the prevalence of insomnia was 11.7%. Also, a study on 1000 Austrian subjects showed that 26% suffered from insomnia, while 21% had experienced severe and chronic insomnia for 1 year or more (12). Another study on 3719 South Korean participants aged above 15 years revealed that the prevalence of insomnia symptoms occurring at least three nights a week was 17.0% (13). A similar survey in Mexico found that the prevalence of insomnia was 36% in a group of 1000 individuals aged 18–84 years, and 16% reported severe insomnia (14). An early study conducted on subjects between 15 and 64 years old in Finland revealed the prevalence of severe insomnia (daily, several times a week) to be 5.14%, depending on the age group (15). In Singapore, 15.3% of individuals aged from 15 to 55 years suffered from persistent insomnia for more than one year. Furthermore, in a study by Hyyppa and Kronholmson, 1099 subjects in Finland revealed that the prevalence rates of frequent or nightly insomnia and occasional insomnia were 12.8% and 62.7%, respectively (16).

There is no doubt that sleep has a positive effect on human's health and well-being. Sleep disorders are the cause of morbidity and mortality and can decrease functional capacity and QOL (17). The impact of sleep disorders is critical to be considered when evaluating QOL in a population. It has been proven that people with occasional insomnia complained more about memory disorders and concentration problems and were less satisfied with their relationships compared with those who did not suffer from insomnia (18). A recent report published by the Institute of Medicine claimed that there might be a huge gap between the strength of the evidence about sleep and sleep disorders and its uptake into the community, which can be, to some extent, justified by lack of knowledge about sleep and sleep disorders among health care providers, including nurses (19). Even when nurses have enough knowledge about sleep, limited time and inadequate resources in clinical settings may create serious problems to sleep quality promotion and sleep disorders treatment (20). As mentioned before, quality of sleep can affect QOL. Due to the important role of sleep quality in nurses' QOL, the present study was conducted to identify the relationship between sleep quality and health-related quality of life (HRQOL) among Iranian nurses.

## **2. Material and Methods**

### *2.1. Study setting and selection criteria*

The study was a cross-sectional descriptive study. The population under the study was shift worker nurses working at hospitals in Shiraz and Tehran (Iran) in 2014. In this study, names and addresses of all governmental and nongovernmental hospitals of Shiraz and Tehran were collected. All hospitals were visited. The objectives of the study were explained for hospital managers and head nurses in order to obtain their agreement. In each hospital, a list of all registered nurses was provided to the researchers by the head nurse. Then, nurses were asked to fill out a structured questionnaire in order to assess their demographic characteristics, including age, sex, occupation, education level, marital status, and income. Finally, the study participants included 1456 nurses working in 11 hospitals. The participants were selected using the census sampling method. First, the eligibility of the nurses who were willing to participate in the study was assessed. Nurses meeting the following criteria were included in the study: 1) willingness to participate in the study; 2) not taking special medications; 3) not under treatment for sleep disorders or any other mental disease; and 4) shift workers (at least six night shifts per month) with more than one year work experience.

### *2.2. Sleep quality*

The term "sleep quality measurement" includes assessing the quantitative aspects of sleep, such as sleep duration, sleep latency, and number of arousals as well as more pure subjective aspects, such as depth and restfulness of sleep (21). In this study, the data were collected using the Pittsburgh Sleep Quality Index (PSQI), which is a 19-item self-report questionnaire evaluating subjective sleep quality, latency, duration, and efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction over 1 month. The score of each component could range from 0 (no difficulty) to 3 (severe difficulty). Besides, the global sleep quality scores (range: 0–21) were computed by summing

up the scores of the seven components. Accordingly, lower scores represented better sleep quality (20). PSQI was used previously to assess sleep quality among patients in hospitals and truck drivers (22, 23). Its reliability and validity were previously evaluated (23, 24). In the present study, the global PSQI and sleep-duration component scores were used to assess sleep quality. The participants with global PSQI scores  $>5$  were defined as poor sleepers, while those whose actual night sleep hours were equal to or larger than the average sleep hours were considered as long-duration sleepers.

### 2.3. Health-related quality of life

In this study, health-related quality of life (HRQOL) was assessed by means of the Persian version of the Medical Outcomes Study Short Form-36 Survey (SF-36)(25). This well-validated 19-item instrument has been widely used in Iranian populations, including hospital nurses. SF-36 encompasses eight domains of health to measure QOL as follows: physical functioning (PF); role limitations due to physical health problems (RP); bodily pain (BP); general health perceptions (GH); vitality (VT); social functioning (SF); role limitations due to emotional problems (RE); and mental health (MH). Each health domain was scored from 0 to 100, with lower scores indicating poorer health status (23–26).

### 2.4. Data analysis

All the statistical analyses were performed using the SPSS statistical software version 15.0 (SPSS Inc., Chicago, IL, USA). Chi-square and an independent sample t-test were used to compare the demographic variables. In addition, Hotelling's Chi-square test was employed to compare the eight SF-36 health domains scores to determine the association between the domains of QOL and quality of sleep. Only the variables that were significantly associated with good sleep were entered into the backward logistic regression model. Ethical committee approval was obtained from all of the institutions in which the study took place.

## 3. Results

Most of the participants were female (89.04%) and poor sleepers. The subjects' age ranged from 19 to 60 years, and their mean age was  $30.81 \pm 7.8$  years. The results showed a significant difference between poor sleepers ( $50.81 \pm 7.8$  years) and good sleepers ( $28.15 \pm 7.60$  years) as well as between long-duration sleepers ( $27.50 \pm 7.49$  years) and short-duration sleepers ( $51.82 \pm 7.67$  years) regarding mean age ( $p < 0.05$ ). The participants with fixed shifts, on average, slept  $7.01 \pm 1.4$  hours per night (range: 5.2–9.8 h/night), while those with rotational shifts, on average, slept  $6.31 \pm 1.2$  hours every night (range: 4.5–8.5 h/night). According to the study findings, poor sleepers obtained significantly lower scores in all SF-36 domains, except for BP, compared with the other participants ( $p < 0.005$ ). In this regard, the largest and smallest differences were related to the VT domain ( $p < 0.001$ ) and the RP domain ( $p < 0.005$ ), respectively. Based on the ranking presented in Table 1, the poor sleepers obtained the highest scores in the BP domain and the lowest scores in the VT domain. On the other hand, the good sleepers gained the highest scores in the PF domain and the lowest scores in the MH domain.

**Table 1.** Comparison of Study Participants Regarding the SF-36 Domains Scores

Variables	All Participants (n=1456)	Good Sleepers (n=226)	Poor Sleepers (n=1230)	Long-Duration Sleepers (n=892)	Short-Duration Sleepers (n=564)
Physical Functioning	68.3 (23.1)	82.75* (20.61)	64.3 (24.3)	75.08* (20.6)	66.3 (19.9)
Role-Physical	60.7 (18.6)	66.92* (15.8)	56.51 (20.6)	63.92* (12.5)	59.91 (19)
Bodily Pain	68.4 (19.7)	59.74 (20.8)	82.89* (17.3)	71.04* (21.2)	68.68 (23.5)
General Health	50.7 (18.4)	59* (17.6)	46.43 (19.7)	58.26* (18.4)	47.4 (18.8)
Vitality	42.3 (17.6)	61.81* (14.9)	36.03 (18.6)	47.15* (14.1)	39.01 (17.9)
Social Functioning	57.2 (19.8)	64.08* (16.5)	53.09 (21.3)	60.37* (17.3)	55.23 (20.2)
Role-Emotional	62.4 (20.7)	67.64* (19.3)	58.69 (22.5)	69.48* (22.7)	60.61 (21.4)
Mental Health	46.8 (19.5)	55.9* (16.7)	42.79 (21.6)	50.67* (18.2)	44.2 (20.5)
SF-36	53.9 (18)				

Data are presented as mean (standard deviation); \* differences between good sleepers and poor sleepers.  $P < 0.005$ , none over lab in confidence interval of two mean; good sleepers: global PSQI score  $< 5$ ; poor sleepers: global PSQI score  $\geq 5$ .

Comparison of short-duration sleepers and long-duration sleepers with respect to the SF-36 domains showed the largest difference in the VT domain ( $p < 0.005$ ) and the smallest difference in the RE domain ( $p < 0.005$ ). As Table 1 depicts, short-duration sleepers ( $< 4.5$  h/night) had lower scores than did the long-duration ones ( $\geq 9.8$  h/night) in all the SF-36 domains. These scores had the largest difference in the GH domain ( $p < 0.005$ ) and the smallest difference in the BP domain ( $p < 0.005$ ). Moreover, the long-duration sleepers obtained the highest scores in the PF domain and the lowest scores in the VT domain. The short-duration sleepers, on the other hand, gained the highest scores in the BP domain and the lowest scores in the VT domain.

#### **4. Discussion**

Over-representation of females and under-representation of males in the nursing population limited this study; yet our results can be generalized to other Iranian hospitals due to their similar distribution of the nursing population (27–30). The prevalence of poor sleep quality among the Iranian nursing population (78%) in our sample was similar to that found in a previous study conducted by Bayat on Iranian women (31). However, the prevalence of sleep disorders in our research was higher compared with the study by Morphy (32). This difference might result from the impact of using different sleep measurements, which prohibits direct comparison of the results. In addition, the demographic composition of our sample (89.04% female) could have led to the high proportion of poor sleepers. The most important finding of this study was the relationship found between sleep quality and QOL. This is in line with the results of a similar study, by Kunert, King and Kolkhorst, which showed that fatigue and poor sleep quality negatively affect hospital nurses' quality of life. Also, Shao, Chou, Yeh, and Tzeng found that sleep quality is correlated with quality of life in female shift-working nurses (1, 2). While in a similar study, male nurses were excluded from the study because of their small proportion among the nursing staff (2), in the present study, females were shown to suffer more from sleep disorders, whereas males have been found to experience better sleep quality in comparison with females (33, 34). The high rate of poor sleep quality in this study might also be due to the fact that most of the participants are rotational shift workers (35, 36). Although some previous studies have revealed that shift work schedules contribute to one of the major causes of subjectively poor sleep quality of nurses (37, 38), it was shown that there is no significant association among sleep disturbances, sleep quality, and work shift (2).

It has been demonstrated that poor sleep quality is a common health problem among hospital staff nurses (2). Findings of the present study revealed a significant difference between poor and good sleepers as well as long- and short-duration sleepers regarding HRQOL in all the SF-36 health domains. Our literature review showed a large number of studies exploring the relationship between sleep problems and HRQOL, albeit with inconsistent results. In Spain, for example, a community-based study demonstrated no association between short sleep duration and low HRQOL score (2, 39). Nevertheless, another population-based cohort study in the same country found a positive relationship between the two variables (40). Furthermore, some studies have indicated significant correlations between shift work and health status (41, 42). Thus, further research is required to determine the relationship between sleep duration and QOL. Our results supported the existence of a positive relationship between QOL and sleep quality but did not find any evidence to prove that QOL is a predictive for sleep quality, which can be attributed to the cross-sectional design of this study. Nevertheless, one study has reported that lifestyle contributes to sleep deprivation (1).

#### **5. Conclusions**

As the main finding of the present study, it was indicated that there is a negative association between sleep problems, which includes poor subjective quality and short duration, and HRQOL. However, our findings about the existence of relationships among QOL, sleep duration, and shift work were not supported by some previous studies. This can result from the fact that this study was cross sectional in design and was limited by factors, such as over-representation of females in the sample. Hence, future studies are required for this issue. Further research is warranted on this significant issue to discover other possible effective factors and, therefore, to help policy-makers as well as administrative personnel to revisit work shift policies in hospitals and develop systematic strategies, which could lead to a sleep-health-friendly work environment for nurses.

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**Conflict of Interest:**

There is no conflict of interest to be declared.

**Authors' contributions:**

All authors contributed to this project and article equally. All authors read and approved the final manuscript.

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